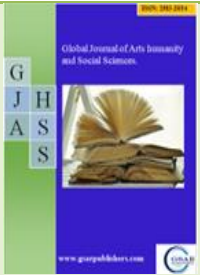
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Reflections on Nano Learning and Teaching: Can it Be a Substitute for Higher Education?

BY

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Abstract

This paper aims to discuss and reflect on the effects of Nano learning (a term first coined by Clive Shepherd, a Learning and Development Consultant in 2005) at the tertiary level. In today's fast-changing trends in education, students barely have the time to focus on lengthy lessons and lectures. They lose concentration and get bored quickly. The solution for the students is that they seek to learn through micro-lessons, and some teachers take recourse to teach students through micro sessions instead of covering a vast area of knowledge or information. Despite differing opinions, most of the educators believe that the purpose of getting a Higher Education is to advance student learning. It is strongly believed that university education is a platform for lifelong learning where learners are expected to learn, retain, and apply what they have learned during a four- to five-year study span. Hence this reflection investigates the effects of nano learning/teaching. The progressive educators have discussed the pros and cons of this emerging trend through questioning and critical observations. Therefore, it questions to what extent this trend will successfully replace the standard of a formal university education.

Keywords: effect, higher education, nano learning/teaching, student, technology

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Introduction

When we say Higher Education (HE) it refers to an advanced level of education that comprises a community of teachers and scholars. It is beyond the secondary education level, where many courses are offered in specific areas. A report by UNESCO in 2024 stated that some 254 million students are enrolled in universities worldwide – a number that has more than doubled in the last 20 years and is set to expand. It is because Higher Education promotes a rich cultural and scientific asset that enables personal development and facilitates economic, technological, and social change. It encourages the exchange of knowledge, research, and innovation and equips students with the skills needed to meet ever-changing labour markets. According to Cotrell (2019), the experience of studying in Higher Education can be life-changing. University education gives immense opportunities to study interesting subjects, to feel stretched intellectually, to explore new ideas, to engage in a wide range of new activities not easily available elsewhere, to find out about oneself and how one rises to the challenge of academic study, to consider the kind of person that they want to be in the world. In short, higher-level study is different from school or high school education. The more a student

engages with the course, the greater the possibility that the student will succeed, thrive, and excel too (Cotrell,2019). Also, university education allows students to learn courses and apply them later in life. It makes them more creative and allows them to question ideas and issues.

In today's digital era students lack the time and concentration span to focus on long lectures or spend much time in class. Due to the availability of too many devices and easy access to the Internet, the causes of distraction are increasing daily. Several studies have claimed that brains can focus on any lesson from ten to fifteen minutes to a maximum of forty-five minutes before it loses its steam, and it needs time for consolidation and reflection. Some educators believe we are losing our ability to focus and retain new information because of our daily sensory overload. In contrast, others think that it equips us to take in more information and retain it. And the more chunked down it is—meaning broken down into bite-sized blocks of information—the more we learn and are prone to take action on what we have learned (Hudovernik, 2021).

Background of Nano Technology/ Learning



In a study by Aburizaizah & Albaiz (2021) the definition of 'Nano' has been given as:

Nano is one of the prefixes used in the International System of Units to form the names and designations of decimal units. A unit whose name is formed by adding nano to the name of the original unit is the result of the multiplication of the original unit by 10⁻⁹. In other words, the newly formed unit is equal to one billionth of the original unit. The term 'Nano-learning' was first coined by Clive Shepherd, a Learning and Development Consultant. In 2005 he first used the term in a blog.

Nano learning, a term from the Greek 'nanos' meaning 'dwarf,' represents small, focused, bite-sized learning experiences (Ryan, 2023). By understanding the meaning of the word 'Nano,' the meaning and designation of nano-learning can be more easily understood (Aburizaizah & Albaiz, 2021). According to the Digital Learning Institute, 'Nano learning is a learning design trend created to educate learners on a topic through short, informal learning particles, usually less than two minutes long. There is no interaction with the instructor as it is carried out via electronic media.' Nano learning also called micro sessions or microlessons—is a short two- to ten-minute, multi-media-rich tutorial. (Hudovernik, 2021).

If we look at the birth of nano-learning, we can say that with the birth of Connectivism as a historical evolution of education and the birth of e-learning 2.0, which is developed by Downes (2005), a new branch of education derived from e-learning and based on small pieces of learning, known as nano-learning, was also born. By 2000, the digital world underwent a tremendous change due to the power of the Internet and the vast number of Internet users worldwide. It allowed people to search, explore, and engage with each other in an interactive community (Al Shehhi, 2022). From using cassettes to CD players and television to desktops to laptops, the current trend has shifted to using smaller and individual devices where each learner has a single device such as a tab or a smartphone and follows specific techniques that promote problem-learning with problem-solving or specific function performance.

With the growth of the concept of 'alternate credential,' which refers to non-traditional (non-degree credentials) by higher education institutions, learners are drawn towards achieving degrees without formal university education. Hence, the growth of nano-learning/teaching has drawn much attention in the digital era. They are growing in trend as they refer to "competencies, skills, and learning outcomes derived from assessment-based, non-degree activities [that] align to specific, timely needs in the workforce (Lorenzetti, 2016)." The Massive Open Online Courses (MOOCs), micro-credentials (badges), and credit or non-credit bearing certificates provide various other options and opportunities.

The benefit of nano learning is that lessons can be accessed anywhere with access to Wi-Fi or data service, 24/7 since they are primarily accessed through smartphones and tablets. This approach aligns with the children's growing inclination towards digital technology and the 'snackable' consumption of information (Ryan, 2023). Nanotechnology presents several useful applications for

everyday use as we bridge the twenty-first century with the twenty-second (Baughman et al., 2023). The revolutionary educational concept here is that learners do not need the active participation of an instructor. Anyone can have a brief session of information/instruction whenever it is accessible.

Since nano lessons are delivered through text messages or online platforms like Twitter, TikTok, and YouTube, each lesson focuses on learning just one thing to fulfill the need to know or learn something instantly. Some lessons are even interactive. These microlessons may or may not be linked to more in-depth information, leading to longer learning sessions if the student desires. Teachers can use them as stand-alone lessons or supplemental material to help students with location-based comprehensive learning at traditional grade and high schools, as well as technical schools. The idea behind nano learning is to provide learners with focused, targeted information that can be immediately applied in real-world situations. This new approach provides learners bite-sized, digestible content, allowing them to gain knowledge quickly and comfortably (Khara, 2023).

Due to the increase in social media platforms, learners are more interested in gaining knowledge and information using TikTok, Snapchat, or YouTube. They are more drawn to learning through short videos than listening to traditional lectures. Nano-learning contains a wide variety of multimedia, such as text, video, sound, and images, all of which keep learners engaged. Since digital natives are with smartphones, tabs, and laptops 24/7, nano learning gives them immense access to make use of these short informative videos anytime, anywhere.

Several Arguments in Favour of Nano-Learning/Teaching

There are several arguments in favour of nano teaching and learning. Studies show that, on the one hand, university education is extremely expensive, but on the other hand, too many people get higher education. If nano degrees show a viable alternative, they could help reduce the inflation suffered by recent graduates by existing as vocational education (Wilkinson et al., 2018). Researchers also say that learning is successful by breaking down information into small chunks, having prior knowledge, and avoiding distractions. A study by (Al-Shehhi, 2022) on the use of nano learning in teaching and learning English in Dubai supports the use of technology, reflecting various opinions of the participants in favour of using technology in class. The study showed that 91.1% of participants opined that students can better grasp information through videos, audio, images, and illustrations. However, in the same study, it has been pointed out that there are still several students who believe the teacher's role is important and rely on the verbal explanation of teachers to have a thorough understanding of the lessons. Some of the researched benefits of nano learning by (Walker, 2023; Ryan, 2023) are:

1. Enhancement of engagement
2. Retention and understanding
3. Personalization and flexibility



4. Digital literacy
5. Small amount of information
6. Fulfilment of immediate requirement
7. Time efficient
8. Targeted learning
9. Accessible
10. Continuous learning
11. Cost-effective

In a digital era, the benefits mentioned above draw the attention of learners and educators immediately as teachers all over the world struggle with the issues of presenting vast sources of information within a limited time, retaining student attention, managing large classes, burnout, students not seeking help or support when needed, lack of motivation and so on. Moreover, nano-learning is particularly popular amongst Generation X and Z because this generation grew up with digital devices. Fast and entertaining content provides learners with the information they need in a way that holds their attention (Marks, 2021). In other studies, it has been stated that one of the features of alternate credential programs is that it is shorter than a four-year baccalaureate or a graduate degree and it costs less. The fewer prerequisites or admission requirements make it more accessible to learners than getting a liberal arts degree. Moreover, Certificate and "professional degree" programs like Microsoft's hone a particular skill set, aiming to prepare students for particular types of jobs or careers (Hogle, 2016).

On the other hand, looking from students' perspectives, there are several challenges that students have to cope with in the class, such as large classes and teachers failing to give attention to all, time management, study stress, missing out on lectures, struggles to cover a vast amount of information, commuting long distances. In such cases in the digital era, nano learning is the only option students would welcome where they can learn at their own pace with flexibility.

Concept of University Education

Several factors draw the attention of reflective educators on university education. In today's digital world, one can easily claim that without technology, there is no learning. Numerous studies and research have been conducted on the use of technology to benefit education. While there are positive aspects, studies have also focused on the drawbacks of using too much technology for learning.

On another note, if we look at the significance of university education, teachers and students worldwide cannot deny the importance of a formal university education. Studies show that the importance of getting a university education cannot be stressed enough. In the job market, a university education will separate a candidate from the rest of the other without a university degree. The most important thing one gains from Higher Education is confidence. Confidence in oneself and abilities will help a person succeed in any endeavour he/she chooses to pursue.

Furthermore, attending school helps further one's career by providing opportunities like internships, university research labs, and networking events where one can meet people in the field they

want to enter. Higher Education is an important part of youth. It helps shape new generations into responsible, productive members of society (Negineema, 2023). Hence, if a person wants to stand out from others and obtain his/her dream job, the best way to do so is with a college degree, preferably one related to his/her chosen career path.

According to a study conducted by Brooks et al. (2021), where the researchers included 295 students from six different countries, namely (Denmark, Germany, England, Ireland, Poland, and Spain) students view the purpose of Higher Education (HE) as preparing them for the labour market. They emphasized the importance of tertiary-level study for personal growth and enrichment, societal development, and progress (Brooks et al., 2021). Their studies show that the student participants opined that (HE) means a way to get good qualifications, which will help them to get good jobs in the future. Today's job markets are very tough, and good companies and institutions look for candidates with well-rounded education. Higher Education is all about learning new ways of thinking and acquiring problem-solving skills. A 2019 study showed that people who hold a bachelor's degree earn 84% more in their lifetime than those with a high school diploma. With a degree, a person can get a highly skilled job.

A similar study also stated that Higher Education is an investment to help secure upward social mobility (Harrison, 2019). Another commonly articulated purpose of Higher Education was related to ideas about personal growth and enrichment. Some participants believed and emphasized that they were growing through learning. They supported that university education allowed them to 'delve into other topics and to develop...' Others, however, placed more emphasis on aspects of more expansive learning that they had experienced since embarking upon their degree-related to, for example, interacting with a more diverse group of people than they had previously and having to be more independent (Brooks et al., 2021). Research has also been done on the advantages of Higher Education and the importance of alumni. A strong alumni community can help provide a strong network for job search. Many universities invite their alumni to come back and help graduates find opportunities within their field of study. Moreover, today's labour market looks for highly skilled professionals at all levels to deal with the rapidly changing nature of the workforce (Ramley, 2014).

Hence, reflective educators question the emerging trend that if nano-learning could replace teachers' and professors' lectures at the higher level, why do hundreds and thousands of students worldwide still struggle to get admitted to universities to get degrees? What holds them back from embracing nano-learning and gaining sufficient knowledge to compete in the job market? Why do scholars, researchers, and academics all over the world study, research, and present scholarly lectures, and millions of people attend these scholarly lectures or thought-provoking presentations? Can all kinds of learning and teaching be driven by nano-learning? This brings us to question the issue further by reflecting on: What is the future of nano learning/ teaching? Can nano learning and teaching replace Higher Education?



Several studies have shown the effect of nano learning/ teaching on Elementary and Secondary Education. Nano-learning can be integrated into the curriculum of educational institutions to improve student engagement and retention (Khara, 2023). Studies show that teachers have successfully captured the attention of young scholars related to the lessons on addition, subtraction, or foundational principles of phonics. Children can retain information more than adults. For example, three-year-olds could pick up vocabulary by regularly exposing themselves alone.

However, there are few studies on the effects of nano learning at the higher level. The existing studies discuss the need for distance learning, which had become an alternate approach during the COVID-19 period when learners had to go through the process of distance learning instead of suffering from the phenomenon of learning loss. Most studies promote nano learning on the basis that during the COVID-19 period, online learning gained much popularity. One must remember that COVID-19 was a crisis that created various obstacles in all spheres of life. Short-term solutions were introduced to cope with the educational system back then. A short-term strategy for facing a particular crisis may not be a lifelong solution. Also, students were learning through the help of teachers and professors even then. Technology had not replaced teachers. Teachers/ instructors/ professors were still there to guide and supervise the learners. Therefore, at the present moment, when people are out of the COVID-19 crisis and reflecting on the future, it still needs to be clarified how nano-learning and teaching can be an alternative to university education. One wonders how nano-learning can replace vast and informative courses at the university level, which are interconnected.

University study in most countries ranges from three to four years to complete graduation. Each course is connected to the course at the next level so that the learners have sufficient background information when taking new courses. They are related conceptually, which makes learning connected and not isolated as chunks of information to fulfill immediate needs. It takes several years of learning and practice to finally achieve a university degree, making a candidate eligible for a university degree. This degree/ certificate, in turn, makes him qualified enough to apply in the job market, competing with hundreds and thousands of other qualified candidates.

Hence, progressive educators reflect on the application of nano-learning and teaching in Higher Education. According to Constructivist Learning Theory, or CLT, students learn new information by building upon — or in other words, constructing — knowledge they have already gained (Piaget, 1964). If we examine the factors contributing to learning, we see that individual and environmental factors are critical to the constructivist theory of learning. The specific interaction between these two variables creates knowledge (Ertmer & Newby, 1993). Based on these two factors, the best learning will occur in a realistic setting that reflects the topic being learned and will consist of tasks relevant to a student's typical past experiences. Brown et al. (1989) also added that the culture or specific context of the environment are the most salient and influential contributors. Hence, reflective educators question the long-term effects of nano learning on the learners and how far they are competent enough to apply the knowledge they have

learned through short videos, sometimes without an instructor, and if they will be able to retain and apply that knowledge and experience in the real world.

Current research points out that students/ learners have lost their attention due to increased use of devices and technology. It is difficult for teachers to keep the students engaged in long lectures or lengthy materials. On the other hand, studies also show that the human brain does not get tired of listening to long lectures or talking with the teacher as long as a learner needs to get the required knowledge/ information on a particular topic. Therefore, when it is stated that students lose their attention or interest in a lecture or the classroom, it is not pondered over that if too much technology is incorporated into the class during lessons, it is unavoidable that learners will lose their attention or focus. The class duration at the tertiary level usually lasts from 50 minutes to 90 minutes or 120 minutes. Educational videos are essential for making the students participate actively, but within the period of 50 minutes or 90 -120 minutes, how many videos should be played in the class to explain every topic in bits of information? Even if they are played, can the learners understand and retain that information for long? Using technology is highly encouraged, but can all types of learners learn everything by watching short videos and sometimes without proper explanations?

Drawbacks of Nano-Learning/Teaching

Based on the educators' reflections on the micro sessions, we can look at the drawbacks of nano-learning/teaching. There is no face-to-face interaction, and in many cases, learners feel isolated. Moreover, it is stated that some discussion and competing platforms do not assist in the case of a large number of students in problem-solving situations, and students who need help understanding a particular topic cannot benefit much from such platforms (Al-Shehhi, 2022). Moreover, nano learning engages learners too much on the use of tech more than the other effective modes of teaching. (Hudovrnik, 2021). Due to limited depth, lack of context, and limited retention scope, it is difficult to expect that nano-learning can replace university education. Nano degrees provide targeted training for one job, whereas a classical liberal arts education provides skills for different jobs (Railean, 2017). A classical liberal arts education can provide a wide range of skills, making a student major in one subject but have subskills to handle other related areas.

For example, when we think of teaching and learning English at the tertiary level, there are various factors that should be considered. Studying English Language courses benefits those aspiring to work in multinational companies, serving as teachers or professors, working in tourism industries, and several other professions. It might be the case that a university graduate in English Literature has to teach courses related to the four skills - Reading, Writing, Listening, and Speaking, along with the subskills — Grammar and Vocabulary. In such a situation, one wonders how a student exposed to nano-learning trends will teach skills courses that require a vast amount of knowledge to teach students at the tertiary level. University students think critically, question, ponder, and discuss. In such cases, is it possible to acquire knowledge at all levels through nano-learning? Moreover,



can they read and retain every lesson through short videos? This brings us to the question of how long a student will spend on screen- watching videos. What would be the after-effect of this?

Effects on the Job Market with Nano-learners

As nano learning is emerging in education, the effects of nano learning in the job market are yet to be explored. As it is based on specific skills, there is never the chance for in-depth understanding. It also lacks the possibility of providing suitable context(s) for a lesson. There are numerous studies that have focused on the drawbacks of superficial knowledge. Nano-learning will provide superficial knowledge that will only fulfill the immediate need. The job markets in the digital area look for highly skilled employees to combat everyday workplace challenges. Moreover, not all employees may have the same learning needs, and this approach may not address specific areas of improvement for each employee (Hadsvik, 2023).

How would the late twenty-first-century youths apply the knowledge and skills they gained through nano learning, which perhaps would be without instructors? Job markets have always preferred a knowledgeable as well as skilled workforce. Hence, is it possible for a workforce that has gained knowledge through nano-learning to involve/ engage students at the tertiary level in discussions on issues that will require a vast amount of knowledge, information, and expertise? Would it be possible for postgraduate-level professors to impart knowledge to future scholars if they had been nano-learners and had never attended a university or achieved a formal university education? These are queries yet to be answered.

Conclusion

As today's generation is tech-savvy, technology is growing and will continue to dominate all spheres of our lives. Educational scenarios have changed and will change. However, there will always be demand for students who have a formal university degree/qualification to apply for jobs. This reflective essay has investigated the effects of nano learning/teaching at the higher education and has shed light on to what extent this emerging trend can replace the standard of a formal university education. Hence, one can draw the conclusion that nano-learning can be only a supplementary approach. It cannot be a substitute for comprehensive programs addressing complex issues or a replacement for traditional learning. If nano-learning could replace teachers' lectures and teaching methods, students worldwide would not struggle to get admission to good educational institutions. The best learning occurs in a realistic setting that reflects the topic being learned and consists of tasks that are relevant to the typical past experiences of a student. Therefore, it would be revolutionary to say that vast information presented in courses prescribed for university education can be replaced by nano learning/teaching.

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